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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71)(72) Applicant and Inventor: CHUNG, Joong, Suck [KR/KR]; 980-45, Hawang-2-dong, Sungdong-ku, Seoul 133-022 (KR).

(74) Agent: AHN, Sang, Kook; 983-5 Daechi 3-dong, Kangnam-ku, Seoul 135-283 (KR).

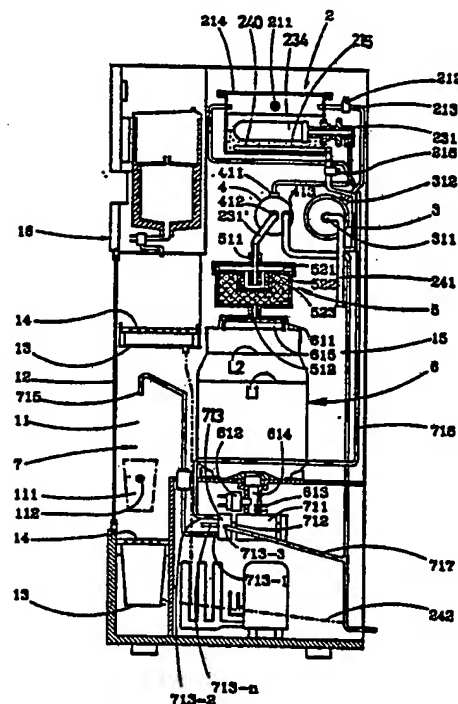
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(54) Title: WATER CLEANING APPARATUS

## (57) Abstract

Water cleaning apparatus comprising a ceramic filter which filters a supplied original water and supplies to next equipment, cleans and water cleans the ceramic filter at every cleaning cycle, a filtered water container which stores said filtered water and provides the stored filtered water and a drinking water, a filtered water supply means for supplying filtered water so as to be able to drink from said container, and a control means which executes a cleaning of the ceramic filter at every cleaning cycle, and circulates or delivers the filtered water stored in the container at every circulating cycle, and receives a demand of supply and supplies the filtered water stored in the container.



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## WATER CLEANING APPARATUS

## TECHINICAL FIELD

the present invention relates to a water cleaning  
5 apparatus which is made to filter a service water or a  
spring water, store a filtered water, provide the  
filtered water so as to be able to use, clean and water  
clean a filtering ceramic filter, and circulate to be  
able to clean again.

10

## BACKGROUND ART

A discharging quantity of public environmental  
pollution material is hugely expanded due to a fast  
development of industry and an expansion of population.

15 And so, air, soil and water quality are polluted to  
serious condition in many regions, and since a contents  
of foreign material are contained too much in a natural  
water in many regions, it is a situation that they are  
impossible to directly use as a drinking water.

20 According to this, a drinking water cleaner for  
filtering for using the service water or the spring  
water as a drinking water has become to be universa-  
lized. A conventional water cleaner as this obtains  
a filtered water by passing an original water such as  
25 service water, spring water, river water (they are  
called as an original water herewinafter) being a

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filtering object through the filter by using more than one of substantially ceramic filter (capillary tube filter), memberane filter, active carbon filter and the like.

5           However, when reviewing a problem of this conventional water cleaner, a clean water can be obtained since the filter is clean when the water cleaner is used at the begining, but a filtered dirt and mud become accumulated to the filter as a filtering time is elapsed,  
10           and a unclean condition of the filter becomes serious as the filtering time is elapsed by and by. And then, when the original water is filtered by the uncleaned filter, an obtaining filtered water becomes also uncleaned and a bad smell may be included also if in case when  
15           it is serous.

          Another problem is that the filtered water stored by filtering with the filter has lost an antibiotic ability whereby easily be spoiled, and a resolved oxygen reserving quantity is also decreased as the time being  
20           elapsed whereby a freshness becomes also lost, therefore a value as a drinking water becomes lost.

#### DISCLOSURE OF INVENTION

          The present invention aims to offer a water cleaning  
25           apparatus improving problems of the water cleaner as above, and a first object is to provide a water cleaning

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apparatus in which a cleaning device is included to a  
cermic filter (capillary tube filter) being a filter of  
the water cleaning apparatus whereby the filter is  
cleaned with a predetermined time interval, and an  
5 accumulated quantity of dirt and mud is minimized by  
clearly cleaning with water whereby a clean filtered  
water same as a time whenever firstly using the water  
cleaning apparatus.

Second object is to provide a water cleaning  
10 apparatus in which since a stroed filtered water is  
circulated to be contained to the original water with a  
predetermined time interval or else disposed as sewage  
and new filtered water is stored, a drinking water that  
a resolved oxygen preserving quantity is decreased and  
15 having a worry of spoiling is made not to be used as a  
drinking water.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagram showing an entire construction  
20 of best embodiment of the present invention.

FIG. 2 is a diagram of corss sectional construction  
of the embodiment of a ceramic filter of the present  
invention.

FIG. 3 is a cross sectional view showing the ceramic  
25 filter of FIG. 2 from another angle, and

FIG. 4 is a block diagram of the embodiment of a

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control means of the water filtering apparatus of the present invention.

BEST MODE FOR CARRING OUT THE INVENTION AND INDUSTRIAL  
5 APPLICABILITY

In FIG. 1, the water cleaning apparatus is equipments of spaces which supports various devices of the present invention and which is accompanied by adding to this invention and provided for satisfying a service  
10 requirement, as in concrete, which are equipped to a cabinet 16 including a filtered water supplying and chamber 11, a glass door 12, a draining equipment 13 and grills 14, 14 compatible with a cup bearing accompanying to it, a filtered water container receiving  
15 chamber 15, and devices for cooling or heating the filtered water and the like.

Its substantial construction is so made by comprising : a pressurizing pump 3 which supplies an original water of service pipe to a ceramic filter 2,  
20 and its requirement is selective, said ceramic filter 2 which filters the wupplied original water and feeds to next equipment and cleans and water cleans the ceramic filter at every cleaning cycle, a membrane filter 4 in which a part of said filtered water is filtered at  
25 multiple layers and another part is separated as sewage and drained to drain, and which is selectively required

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only when it is provided by adding to said ceramic filter 2, a complex processor 5 which passes said filtered water through an ion exchange resin, a permanent magnet, and an activated carbon whereby makes to a fresh water, and that its requirement is selective, a filtered water container 6 which stores said filtered water and provides the stored water as a drinking water, a filtered water supplying means for supplying so as to be able to drink the filtered water from said container 6, and a control means 3 which executes a cleaning of the ceramic filter 2 at every cleaning cycle, and drains the filtered water stroed at the container 6 at every draining cycle, and supplies the filtered water stored at the container 6 by receiving a demand from exterior (user) or else controls other service functions at a time when they are included.

As shown in FIG. 2, said ceramic filter 2 includes:

a filtering tank 214 having a water lever sensor 211 and a water supply pipe 213 attached with an electromagnetic valve 212 ;

a water cleaning means 218 having a water cleaning nozzle 215 contained at bottom of the filtering tank 214 and a water cleaning water supply pipe 217 attached with an electromagnetic valve 216;

a water draining means consisting of a partitioning wall 321 for partitioning the filtering tank 214 to a

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draining chamber 220 and a draining pipe 223 attached with an electromagnetic valve 222; and

a cleaning means 210 consisting of a water passing pipe 233 which is supported to a water tight supporter 230 attached to the filtering tank 214 and connected to a filtered water guiding pipe 237 side water tight connecting means 232, a rotatable ceramic filter 234 which is attached to inner side of the water passing pipe 233 and contained within an original water 250 within the filtering tank 214 and flows the filtered water to a guiding pipe 231 through the water passing pipe 233, a ceramic filter rotating means 239 which is made by connecting a pulley 235 on the water passing pipe 233 and a pulley 237 of a cleaning motor 236 side outputting a reduced rotating power by a belt 238, and a cleaning sand 240 which is contained within the filtering tank 214 so as to be able to clean a piled dirt and mud at a time of rotation of the ceramic filter 234.

The pressurizing pump 3 is selectively provided for raising a filtering speed or else for pressurizing a filtering pressure to the membrane filter 4, and which connects the original water supply pipe 241 to a water supply opening 311 and connects a discharge opening 312 to said water supply pipe 213.

And, when the pressurizing pump 3 is selected, the

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filtering tank 214 provides a water tight cover 214 and makes the discharging water pressure of the pump 3 reaches the original water supply pipe 241.

In case when the pressurizing pump 3 is deleted,  
5 the original water supply pipe 241 is connected to the water supply pipe 213.

The membrane filter 4 is a multiple capillary filter capable of obtaining as a finished product form and selectively provided with a finished product for  
10 raising a filtering accuracy, and the water supply opening 411 is connected to said filtered water guiding pipe 231 and the water discharge opening 412 is connected to next equipment and the dirt and mud water drain opening 413 is connected to the drain line 242.

15 The ecomples processor 5 contains an ion exchange resin 521, an activated carbon 522, and a permanent magnet 523 within the container so as to be contacted to the filtered water and its establishment is selective, and a water supply opening 511 is connected to said  
20 filtered water guiding pipe 231' (a guiding pipe 231 in case when the membrane filter is deleted) and the water discharge opening 512 is connected to the filtered water container 6.

The filtered water storing container 6 is a glass  
25 container having a cover 611 receiving a supply of the filtered water and a filtered water drain pipe 614

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attached with a water pressure sensor 612 at bottom and a water detecting sensor 613, and a ultra-violet lamp 615 for sterilization is provided within interior.

The filtered water supply means 711 includes a  
5 filtered water pump 711 supplied with the filtered water from the delivery pipe 614 of said container 6, an electromagnetic valve 713 which is provided to a filtered water discharge opening 614 and has a plurality of the filtered water discharging ports 713-1, 713-2, 713-3,  
10 713-n, a water discharging pipe 715 of the filtered water supply chamber 11 connected to said port 713-1, a circulating pipe 716 for connecting said port 713-2 and the filtering tank 214, and a drain pipe 717 connecting said port 713-3 and the drain line 242, and  
15 said port 713-n is allocated to other means for heating or cooling which is not shown.

And, a sensor 112 for detecting a cup 111 from the control means 8 is constituted to said supply chamber 11.

20 Said control means 8 is an equipment for controlling general operations which drives said quoted pressurizing pump 3 under a predetermined condition in accordance with the contained program, controls valves 212, 216, 222, 713, grasping the conditions of sensors 112, 211, 612, 613,....., drives the pump 711, lights on/off the  
25 ultra-violet lamp 615, and changes the control by

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grasping a condition of the control board 824 and the like, and which is constructed by connecting :

a CUP 810, ROM 811 storing the program, RAM for executing the program, a clock 813 required for  
5 executing the program, a micom 815 including input/output device 814, said sensors 112, 211, 612, 613 connecting to the input/output device 814 so that the micom 815 can read the condition, valves 212, 216, 222, 713 in which the micom transmits and open/close  
10 signal to the drives 212', 216', 222', 713' at the input/output device 814 and which connects to be able to open/close in accordance with these open/close signal, pumps 3, 711 connecting to be able to drive/stop by on/off signal transmitting to the drives 3',  
15 711', a ultra-violet lamp 615 making on/off by a signal transmitting to the drive 615', and a control board 624 having a date/time display window 621, a plurality of condition display lamps 822 and a plurality of function selecting keys 823-1, 823-2, 823-3.

20 when a power is turned on which is connected to said various equipments of the cleaning apparatus of the present invention which is not shown, the micom 815 of the control means 8 read in the program (program stored within the control means, herewinafter called as  
25 program) to the RAM 812 and executes an initialization and then circulates main loops of the program and

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controls as followings.

The initializing operation reads a time of the clock 813 and calculates a date and displays the date and time on the date/time window 821, displays how is  
5 a state (a state of remaining amount of the filtered water) of the sensors 612, 613 for grasping the filtered water condition within the filtered water container 6, and the micom 815 displays the state display of the control board as these so as to be matched to a changed  
10 condition also at the main loops of the program after the initialization.

the micom 815 reads a value of the cleaning cycle variable from said main program and compares with the cleaning cycle value (in the embodiment, 48 hours in  
15 winter, 24 hours in other seasons, which are a time band having no filtered water demand; or it can be varied in accordance with the environmental temperature) given by the program, and when it has come to the cleaning cycle, the cleaning cycle variable is initiali-  
20 zed and then a 'cleaning mode' is progressed, and when it is not, the cleaning cycle variable is incremented.

The micom 815 reads a value of a delivering water cycle variable from said program and compares with a delivering water cycle value (in the embodiment, a time  
25 band having no filtered water demand every day) given by the program, and when it has come to the delivering

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cycle, the delivering water cycle variable is initialized and then a 'circulating mode' is progressed, and when it is not, the delivering water cycle variable is incremented.

5       The micom 815 reads a sterilizing cycle from said main loop, and when compares with a sterilizing cycle value (approximately 30 minutes) given by the program, and when it has come to the sterilizing cycle, the sterilizing cycle is initialized and then a lamp  
10   lighting on signal is transmitted and the ultra-violet lamp 615 is lighted on for a predetermined time period (approximately 5 minutes) whereby a sterilization of the filtered water within the container 6 is executed.

      The micom 815 reads a state of the water pressure  
15   sensor 612 from the main loop of said control program, and when a low water level state L1 of the filtered water, transmits a pump 3 driving signal to the drive 3' whereby turns on the power of the pump 3. When the pump 3 is driven, the micom 815 returns to the main  
20   loop and then turns on/off the pump 3 in accordance with next two kinds conditions. that is, when the water pressure sensor 612 is a high water level state 12, a driving of the pump 3 is made to be stopped. When the water sensor 612 is not a high water level  
25   state L2 and simultaneously the water level sensor 211 of the filtering tank 214 detects a water, the driving

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of the pump 3 is made to be stopped for a moment.

The micom 815 transmits a water supply valve 212 opening signal to the drive 212' together with said pump 3 on signal transmitting, and transmits a water supply valve 212 closing signal together with the pump 3 off signal.

when the original water 250 is supplied to said filtering tank 214, a filtered water passed through the ceramic filter 234 is transferred to next equipment through the water passing pipe 233 and the guiding pipe 231, a dirt and mud containing filtered water of a part is wasted to the drain line 242 through the drain 413, the complex processor 5 supplied with the filtered water makes to contact the filtered water to the activated carbon, the ion exchange resin, and the permanent magnet and sends to next equipment, and the filtered water passed through said equipments is stored to the container 6 and supplied at a time of the filtered water demand, and circulated again for filtering or drained.

In case when the micom 815 reads the sensor 112 on signal and a cup 111 is appeared at beneath the discharging pipe 715 of the filtered water supply chamber 11, or when the filtered water supply demand is grasped from the function selecting key 823-1 of the control board 824, executes a filtered water supply

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mode.

At the filtered water supply mode, the micom 815 transmits a port 713-1 opening signal of the valve 713 and a pump 711 driving signal to the drives 713', 711' 5 whereby supplies the filtered water within the container 6 to the cup 111 through the discharge pipe 715, and when a filtered water supply stop condition is given, it transmits the port 713-1 close signal of the valve 713 and the pump 711 stop signal whereby stops the 10 supply of the filtered water.

The micom 815 checks whether or not the sensor 112 off signal that the cup 11 is not detected with the filtered water supply stop condition or a filtered water supplying time period (in the embodiment, a time 15 period becoming to a cup amount is approximately 2 seconds) given by the program from a filtered water supply time point are elapsed, and when these conditions are satisfied, the supply of the filtered water is made to be stopped as above.

20 In said filtered water supplying process, it will be happened a case spilling a small amount of the filtered water to the grill 14, and the spilled filtered water is wasted through the drain equipment 13 and the drain line 242.

25 At said 'cleaning mode', the micom 815 progresses the 'cleaning step', 'water cleaning step' and the

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'draining step' whereby clearly eliminates the piled dirt and mud on the ceramic filter 234 surface.

At said cleaning step, the micom 815 outputs a cleaning motor 236 driving signal to the drive 236' and  
5 then waits a time period of cleaning time (approximately 5 minutes in the embodiment) given by the program and stops the driving of the cleaning motor 238 and progresses the main teop.

The rotating power of said cleaning motor 236 is  
10 borne to the water tight supporter 230 through a transferring system made by the belt 238 and the pulley 235 whereby rotates the water passing pipe 233 connected to the guiding pipe 231 of the water tight means 232.

The rotation of the water passing pipe 233 makes  
15 the ceramic filter 234 to be made with a friction whereby separates the dirt and mud piled on the surface.

At said water cleaning step, the micom 815 outputs an operating signal to the dirves 212', 222', 216' and executes a cleaning operation as below, and waits a  
20 cleaning time period (approximately 5 minutes) given by the program and progresses a draining step.

At said cleaning operation, the micom 815 closes (considering an opened case) and opens the drain valve 222 and the water cleaning valve 216.

25 When said water cleaning operation is started, a water supplied from the water cleaning water supply pipe

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(which is connected to the service pipe) is spouted out from the water cleaning nozzle 215 whereby water cleans the interior of the ceramic filter 234 and the filtering tank 214, and the water cleaning water is  
5 overflowed the partitioning wall 221 and collected to the drain chamber 220, and drained through the drain pipe 223 connected to the drain line 242.

When these operations are progressed during the water cleaning time period, the filtering tank 214  
10 interior becomes a clean state in proportional to a using time at beginning of the cleaning apparatus.

At said draining step, the micom 815 closes the water cleaning valve 216 and waits a draining time period (approximately 1 minutes) given by the program  
15 and makes the valves to return to a state before the cleaning mode and terminates the cleaning mode.

At said circulating mode, the micom 815 operates in following two kind's types in accordance with the designating state of the function key 823-2 of the  
20 control board 824.

When the function key 823-2 is set to a 'circulation' (a basic state), the drain valve 222 is opened and the original water within the filtering tank 214 is drained and the drain valve 222 is closed and then, an opening  
25 signal of the valve 713 port 713-2 and a driving signal of the pump 711 are transmitted to the drives 713', 711

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whereby the filtered water is made to be transferred to the filtering tank 214, and when a state of the water level sensor 612 is grasped and it is a low water level L2, the port 713-2 is closed and a driving  
5 of the pump is stopped whereby the filtered water of a part is made to circulate to be filtered again.

the filtered water circulated and transferred to said filtering tank is filtered again as an original water whereby cleaned and the resolved and preserved  
10 quantity of oxygen is raised whereby a fresh sense required as a drinking water is promoted.

When a state of the function key 823-2 is a 'drain', an opening signal of the valve 713 port 713-3 and a driving signal of the pump 711 are transmitted to  
15 the drives 713', 711 whereby the filtered water within the container 6 is made to be flowed to the drain pipe 717 connected to the drain line 242, and when the micom 815 reads an off signal (no water present signal) of the water detecting sensor 613, the port is closed and a  
20 driving of the pump 711 is stopped whereby the drain of the filtered water is completed.

When the micom 815 receives a 'set' signal from the function selecting key 823-3 of the control board 824, correction routines such as the cycles, the  
25 executing time period, and the date provided by said program are respectively called and executed.

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And, it is possible to use by adding a cooling  
device, a heating device and the like of the filtering  
water being not embodied in this invention, and in this  
case, the cooled or heated filtered water can be  
5 directly utilized.

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## WHAT IS CLAIMED IS:

## 1. Water cleaning apparatus comprising :

a ceramic filter which filters a supplied original  
water and supplies to next equipment and cleans and water  
5 cleans the ceramic filter at every cleaning cycle;

a filtered water container which stores said  
filtered water and provides the stored filtered water  
and a drinking water ;

a filtered water supply means for supplying a  
10 filtered water so as to be able to drink from said  
container; and

a control means which executes a cleaning of the  
ceramic filter at every cleaning cycle, and circulates  
or delivers the filtered water stored to the container  
15 at every circulating cycle, and receives a demand of  
supply and supplies the filtered water stroed to the  
container.

## 2. Water cleaning apparatus comprising :

a pressurizing pump for supplying on original  
20 water of service water pipe to a ceramic filter ;

a ceramic filter which filters the supplied  
origianl water to next equipment and cleans and water  
cleans the ceramic filter at every cleaning cycle;

a membrane filter which filters a part of said  
25 filtered water at filtering materials of multiple  
layers and another part is separated as a sewage and

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drains to a drain, and selectively requires only when providing by adding to said ceramic filter ;

a complex processor which passes said filtered water through an ion exchange resin, a permanent  
5 magnet, an activated carbon layer whereby processes so as to be a fresh water, and that its requirement is selective;

a filtered water container which stores said filtered water and provides the stored water as a  
10 drinking water;

a filtered water supplying means for supplying the filtered water from said container so as to be able to drink; and

a control means which executes a cleaning of the  
15 ceramic filter at every cleaning cycle, and circulates or delivers the filtered water stored to the container at every circulating cycle, and receives a supply demand and supplies the filtered water stroed in the container.

20 3. Water cleaning apparatus as defined in claim 1 or 2, wherein said ceramic filter includes:

a filtering tank having a water level sensor and a water suppling pipe attached with an electromagnetic valve;

25 a water cleaning means having a water cleaning nozzle contained to said filtering tank and a water

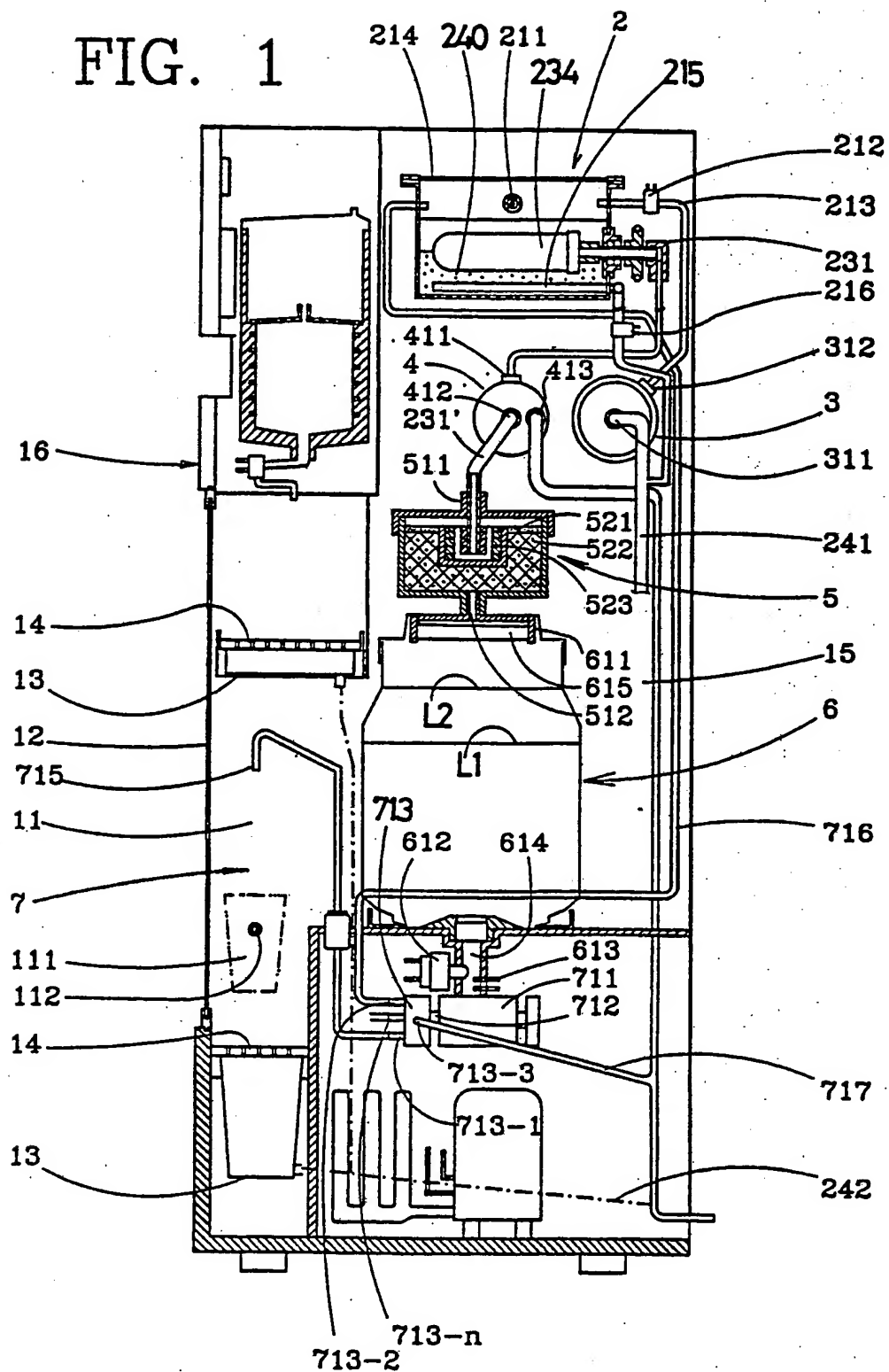
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cleaning supply pipe attached with a water cleaning  
electromagnetic valve; and

a cleaning means consisting of a rotatable water  
passing pipe supported to a water tight supporter  
5 attached to the filtering tank and connected to a water  
tight connecting means of the filtered water guiding  
pipe side, a rotatable ceramic filter which is attached  
to inner side of the water passing pipe and contained  
in the original water within the filtering tank and  
10 flows the filtered water to the guiding pipe, and a  
cleaning sand contained within the filtering tank so  
as to be able to clean a piled dirt and mud at a time of  
rotation of the ceramic filter.

4. Water cleaning apparatus as defined in claim 1  
15 or 2, wherein said filtered water supply means consisting  
of a filtering water pump supplied with the filtered  
water from the discharge pipe of said filtered water  
container, and electromagnetic valve which is provided  
at a filtered water discharge opening of said filtering  
20 water pump and has a plurality of the filtered water  
discharging ports, a discharge pipe of the filtered  
water supply chamber connection to said one port, a  
circulating pipe for connecting the filtering tank with  
said another port, and a drain pipe for connecting said  
25 another port and a drain line.

FIG. 1



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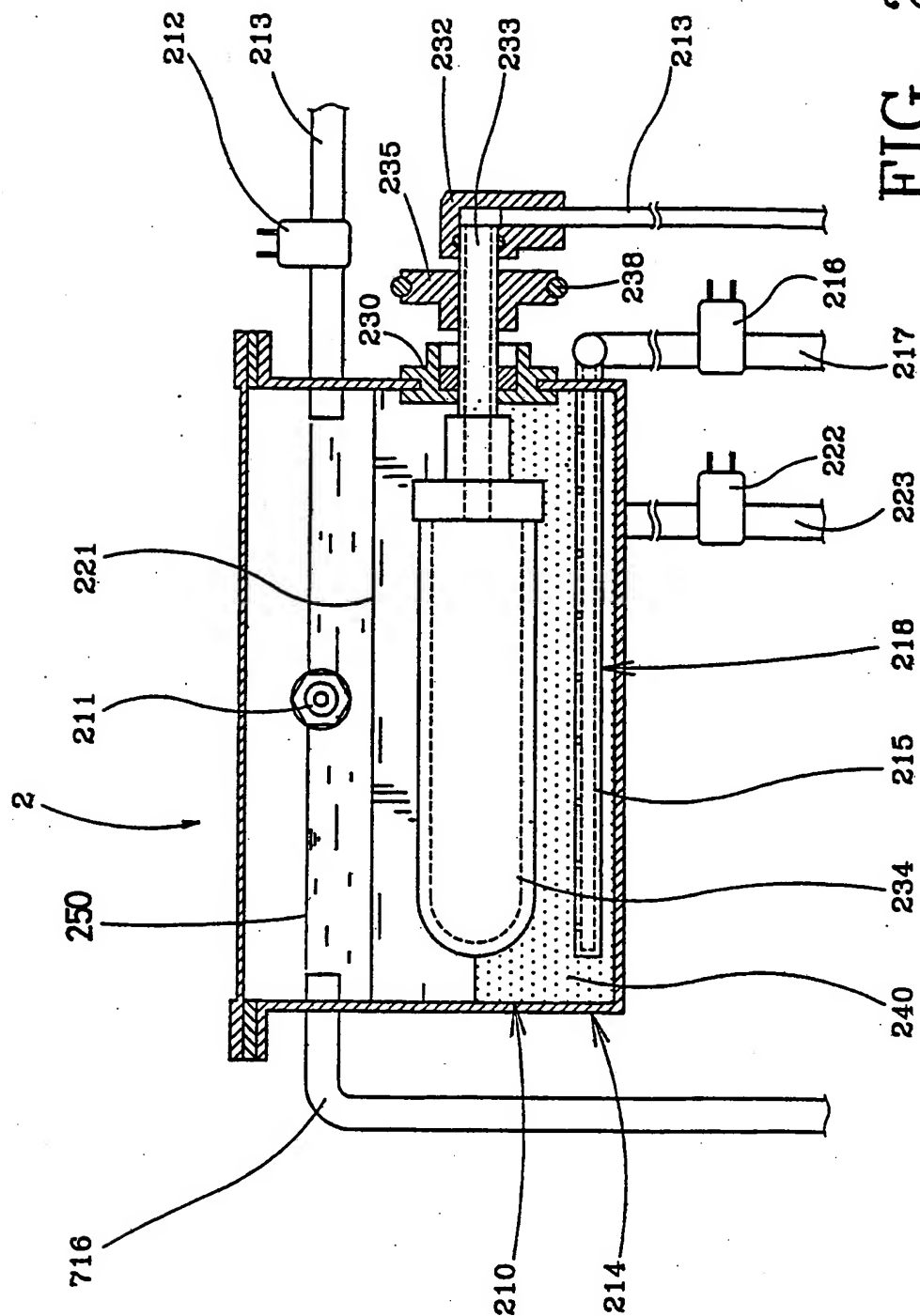
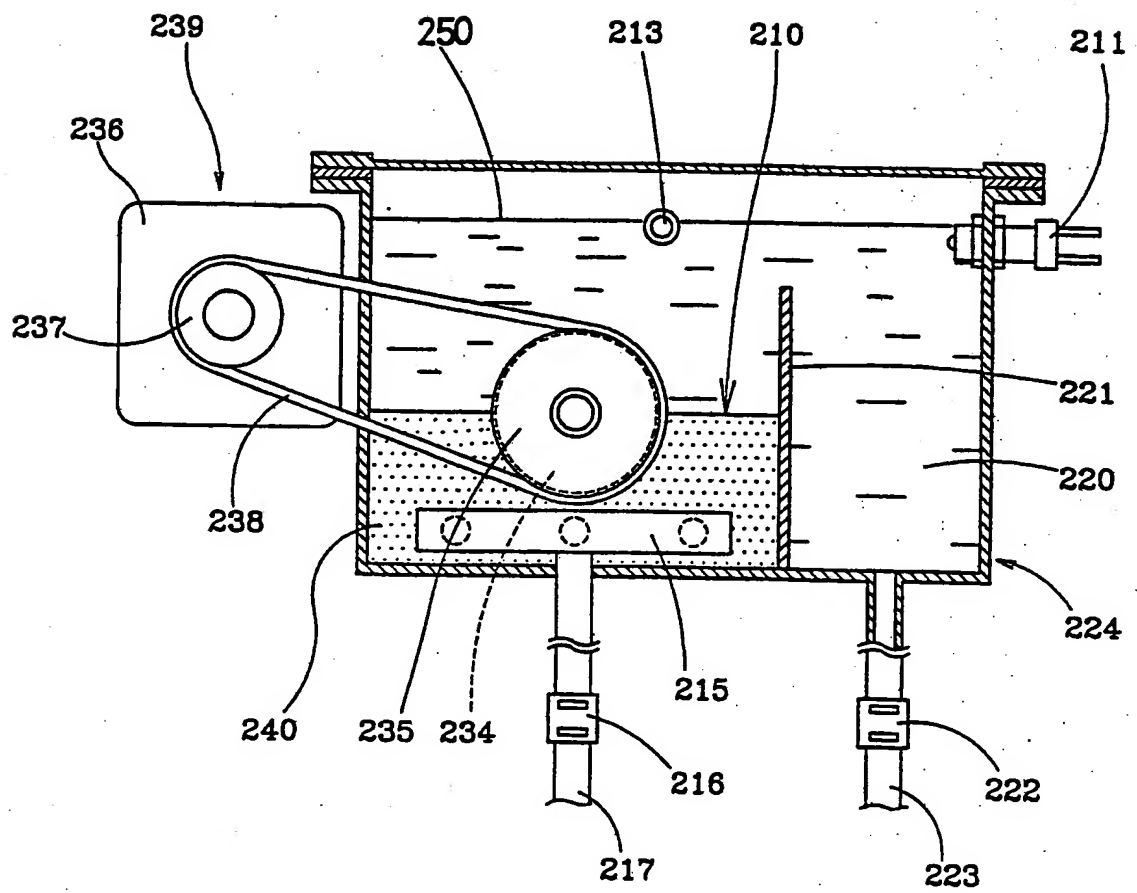


FIG. 2

FIG. 3



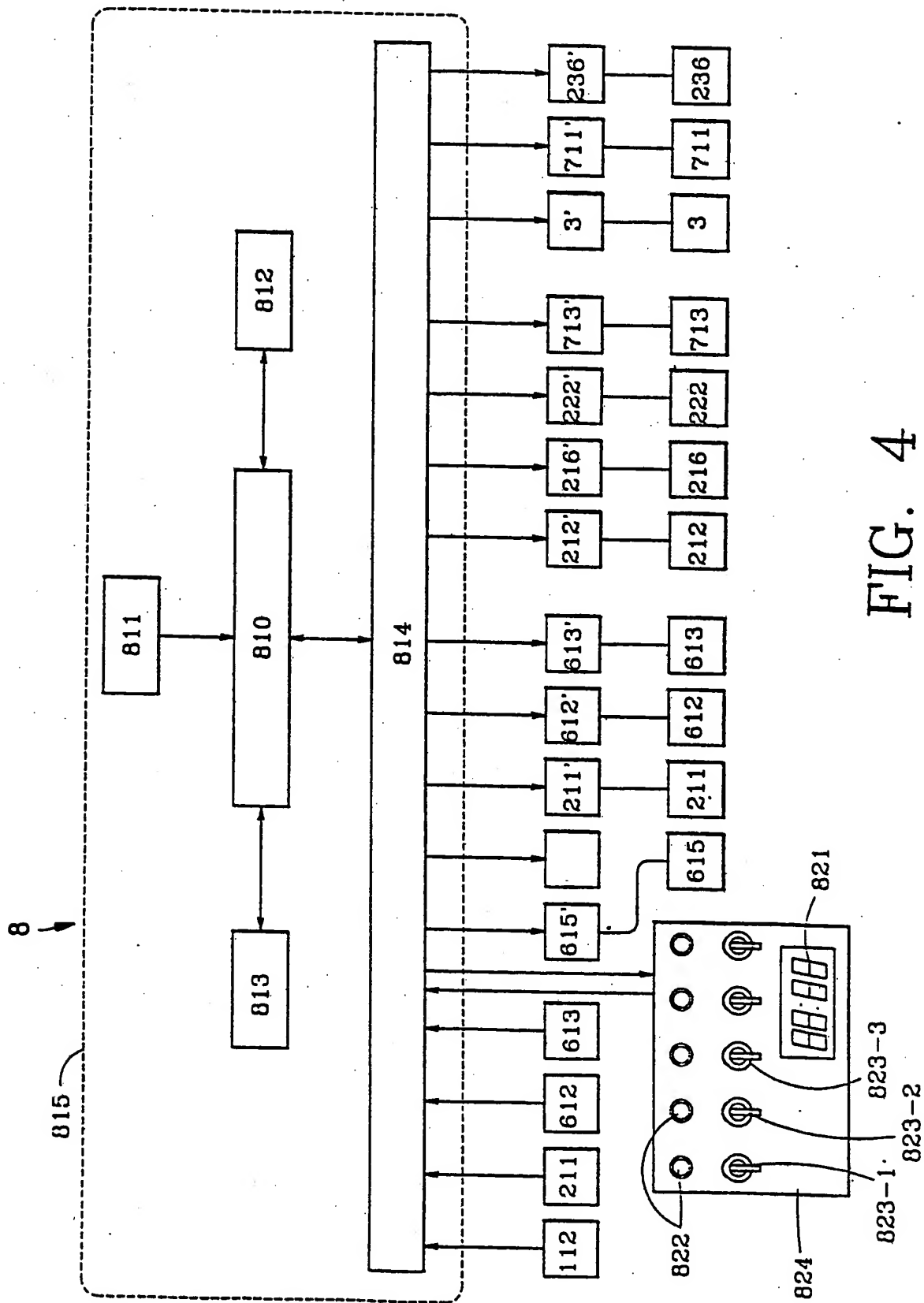


FIG. 4

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR 93/00041

## A. CLASSIFICATION OF SUBJECT MATTER

IPC<sup>5</sup>: C 02 F 1/28

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC<sup>5</sup>: B 01 D 13/00, 39/00; C 02 F 1/00, 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4 909 934 (BROWN et al.) 20 March 1990 (20.03.90), claim 1.	1
A	US, A, 4 317 733 (XHONNEUX) 02 March 1982 (02.03.82), claims 1,7.	1
A	US, A, 4 946 600 (SHIN) 07 August 1990 (07.08.90), claim 1.	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

12 July 1993 (12.07.93)

Date of mailing of the international search report

23 August 1993 (23.08.93)

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